

Date: June 29, 2021

MINISTRY OF ENERGY, MINES AND LOW CARBON INNOVATION

PREPARED FOR: Fazil Mihlar, Deputy Minister, Ministry of Energy, Mines and Low Carbon Innovation

ISSUE: Implications of banning the use of natural gas for residential home heating.

BACKGROUND:

In an effort to meet government's goals for emission reduction by 2030, there have been calls for government to prohibit the use of natural gas as a form of heating in new residential construction within the Province. s.12; s.13

s.12; s.13 The following are relevant implications if such a policy was undertaken by government.

s.12; s.13

s.12; s.13

DISCUSSION:

Provincial Revenue Implications

Carbon tax revenue is expected to decline as emissions decline as a matter of course.

s.12; s.13

s.12; s.13

s.12; s.13

Implications to the Consumer

New Construction

- Heat pumps have a higher upfront cost (an incremental capital cost of \$1,700 and \$3,025 in coastal and interior regions, respectively) in new construction.

Commented [MKE3]: The numbers I provided to Curtis yesterday were based on an average existing home. Economics for new construction are quite different, as they use only a third of the space heating requirements of an average existing building. I've added both here.

- This is currently being mitigated with rebates (up to \$3000 from CleanBC Better Homes).
- When compared against a home with a furnace paired with central air conditioning (a more accurate comparator to a heat pump given its dual heating and cooling functions), the capital cost difference is more than halved.

• s.13

In both cases, the economics improve significantly when compared against a home with a furnace paired with central air conditioning.

New Construction: Comparison of a Better Homes Tier 2 Heat Pump to a 95 AFUE Furnace, installed in 2021

	Incremental Capital Cost	First Year Op Cost Saving	Lifetime NPV	Average annual NPV
Victoria/Vancouver, installed in 2021	\$1,700	\$70	\$800	\$50
Kamloops/Kelowna, installed in 2021	\$3,035	\$20	-\$700	-\$40

Source: EAED, Energy Efficiency Branch

s.12; s.13

Existing Buildings

- In existing buildings, heat pumps have a significantly higher upfront cost (an incremental capital cost of \$8000– and \$13,000 in coastal and interior regions, respectively).
 - This is currently being partially mitigated with rebates (\$3000 from CleanBC Better Homes and plus up to \$5000 from the federal Greener Homes program).
- EAED analysis shows that in the South Coastal region, heat pumps can outperform natural gas furnaces from an operating cost perspective, but this is not the case for other regions in BC—in the Interior, for example, energy costs will be \$70 higher per year.
 - However, when compared against a home with a furnace paired with central air conditioning, a heat pump reduces energy costs.
 - In the Southern Interior, 65% of households have air conditioning (34% have central air conditioning)—a number which will likely increase quickly with increased heat wave events and general climate warming.
- FortisBC publicly states that it costs on average 54% more to heat/cool your home with a heat pump than with a natural gas furnace and air conditioner in the South Coast region. However, FortisBC's estimate of higher energy bills with heat pumps assumes an unreasonably high use of backup electric resistance heat, which results from poor installation.
- The Province and utilities are currently subsidizing best installation practice training and moving towards requiring the use of program registered contractors to access CleanBC incentives.
- The lifetime net present value for heat pumps (which includes capital and operating costs) in both the South Coast and Southern Interior is negative in cases where air conditioning is not required, and positive in cases where it is (not including rebates):

- s.13

Existing Buildings: Comparison of a Better Homes Tier 2 Heat Pump to a 95 AFUE Furnace, installed in 2021

	Incremental Capital Cost	First Year Op Cost Saving	Lifetime NPV	Average annual NPV
Victoria/Vancouver	\$8,000	\$140	-\$1,900	-\$119
with Air Conditioning	\$3,700	\$220	\$3,500	\$219
Kamloops/Kelowna	\$11,800	-\$70	-\$6,800	-\$425
with Air Conditioning	\$5,800	\$60	\$1,000	\$63

Source: EAED, Energy Efficiency Branch

- Over time, the performance of heat pumps is expected to improve using known technologies. s.12; s.12; s.13

Comparison of a Better Homes Tier 2 Heat Pump to a 95 AFUE Furnace, installed in 2035

	Incremental Capital Cost	First Year Op Cost Saving	Lifetime NPV	Average annual NPV
Victoria/Vancouver	\$8,000	\$760	\$2,100	\$131
Kamloops/Kelowna	\$11,800	\$870	-\$300	-\$19

Water Heating

- Heating water is a particular disadvantage for electricity, in both new construction and existing buildings.
 - In BC, electricity costs for an standard storage water heater are approximately double the cost for a standard storage natural gas water heater (\$650 vs \$300/year). Capital costs are not significantly different.
 - NRCAN estimates 19% of residential energy demand is associated with heating water

Implications to Electricity Demand and Generation Capacity

s.12; s.13

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s.12 ; s.13

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DISCUSSION:

Provincial Revenue Implications

If all residential natural gas demand declines to zero (through the eventual attrition caused by housing turnover):

s.13

Implications to the Consumer

- Heat pumps have a significantly higher upfront cost (an incremental capital cost of \$8000 - \$13,000 in coastal and interior regions, respectively).
 - This is currently being partially mitigated with rebates (\$3000 from CleanBC Better Homes and up to \$5000 from the federal Greener Homes program).
- s.13
- Fortis publicly states that it costs on average 54% more to heat/cool your home with a heat pump than with a natural gas furnace and air conditioner in the South Coast region.

s.13

- Heating water is a particular disadvantage for electricity.
 - According to Manitoba Hydro, heating water with electricity costs 147% more than with natural gas.
 - NRCAN estimates 19% of residential energy demand is associated with heating water

Comparison of a Better Homes Tier 2 Heat Pump to a 95 AFUE Furnace

	Incremental Cost	First Year Op Cost Saving	Lifetime NPV	Average annual NPV
Victoria/Vancouver	\$8,000	\$140	-\$1,900	-\$119
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Source: EAED, Energy Efficiency Branch

Implications to Electricity Demand and Generation Capacity

s.12; s.13

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s.12 ; s.13